of the various structures in cells are also discussed; *e.g.* the "vacuole" in Codiaceæ leads to the consideration of its nature, of the "tonoplasts" of de Vries, and of the granules of which protoplasm is built up. So under the bacteria their relations to other organisms as foes or as friends, and their importance in many and different aspects, are well set forth.

But it is needless to multiply examples of the many questions of extreme interest that find a place in the book, such as the existence and significance of "physiological species" among parasitic fungi, the very complex series of forms and relations to their hosts in Uredineæ, and others too numerous to mention.

Nor is it possible in a brief review to attempt to supply any adequate notice of the system of classification employed, or of the links shown or suggested to exist between the groups. The algæ and the fungi are not kept apart, but are grouped together into a system under the ideas explained above. In conclusion, we have to express the hope that this volume may in no long time be followed by the other two, which are to treat of the archegoniate and seed-forming plants. The author has earned the gratitude of botanists by placing within their reach an altogether stimulating book which should do much to win new workers to the absorbingly interesting Thallophyta.

THE COMMERCIAL USE OF PEAT.

Peat, its Use and Manufacture. By P. R. Bjorling and F. T. Gissing. Pp. xii+173; illustrated. (London: C. Griffin and Co., Ltd.) Price 6*s*. net.

W. A. Wheeler

THIS book contains a practical account of the different methods of preparing peat for commercial purposes, and of the uses to which peat can be applied. In NATURE of April 18, 1901, the attention of our readers was directed to the peat industry of Sweden, and its use there as fuel for generating steam both for stationary and locomotive engines; also in the number of May 31, 1900, to the exhibits at the Vienna Exhibition of that year of carpets, blankets, and clothing made from this material.

According to the authors of the book now under notice, there are $3\frac{1}{2}$ million acres of peat land in Great Britain and 6 million acres in Ireland. The peat varies in depth from 2 feet to 40 feet. Peat is also abundant in Canada, Denmark, Holland, Germany, Russia, and other countries.

The chief importance of this material at the present time is its value as fuel in districts where coal is scarce. Its great bulk as compared with coal, and its high percentage of water, have, however, hitherto proved obstacles to its extended use. The valuable portion of fuel is its carbon content, and in this respect peat is inferior to coal. An average sample of peat contains 42·7 per cent. of carbon, 4 per cent. of hydrogen, 27·4 per cent. of oxygen, 1·6 per cent. of nitrogen, and 2·4 per cent. of ash. In some specimens the carbon reaches as much as 66·55 per cent. of carbon. Wood contains 52 per cent. of carbon, brown coal 66 per cent., Swedish coal 78 per cent., and English steam coal 81 per cent.

The following results are given of the testing of peat fuel as against coal at Horwich, in Lancashire, under a steam boiler. Coal got up steam to 10 lb. pressure in 2h. 25m., and to 25 lb. in three hours. Peat fuel got up steam to 10 lb. in 1h. 10m., and to 25 lb. in $1\frac{1}{2}$ hours. Twenty-one hundredweight of coal maintained steam at 30 lb. pressure for $9\frac{3}{4}$ hours, whilst $11\frac{1}{4}$ cwt. of peat fuel maintained steam at the same pressure for 8 hours.

Peat has been used on the Bavarian railways for more than sixty years, and has been found economical. It is claimed for peat that, being free from sulphur, it has a much less detrimental effect on the heating apparatus than coal or coke. As regards cost, pressed peat costs 7*s*. 4*d*. per ton, Saxony coal 4*s*. 9*d*., and Ruhr coal 5*s*. 5*d*.; but if cost of carriage be taken into consideration, the peat is 7*s*. 4*d*. against 8*s*. 11*d*. and 9*s*. 8*d*. for the coal.

Experiments were made on the Hartford and Springfield Railway, when a locomotive engine ran in express time 52 miles with 14,000 lb. of peat; and it was found that two-thirds of a ton of peat was equal to one ton of coal for locomotive purposes. Several other trials made with peat for locomotive purposes are given by the authors, and there is no doubt in countries where coal is scarce and peat plentiful the peat bogs may be utilised with very great advantage.

Gas has also been made from peat with very successful results, and in Sweden it has been used for regenerating, puddling, and open-hearth furnaces for the last thirty years. It has also given very satisfactory results for illuminating purposes in Ireland. From a single pound weight of peat one hour's light can be produced; in some peat there is as much as 14,000 cubic feet of gas per ton. In Sweden a ton of peat was found to yield 9295 cubic feet of gas of twenty-four candle-power, a ton of English coal tested at the same time yielding 7063 cubic feet of gas of fifteen candle-power, the by-products being also largely in favour of the peat. Paraffin for candle-making is also distilled from peat.

Another use to which peat has been largely applied is in the manufacture of paper, which dates back in Ireland to 1835. Yarn for weaving purposes is also made from peat. There is now being sold by Messrs. Doré and Son, of London, underwear manufactured from peat. It is also considered an excellent material for bandages and surgical purposes. The other uses to which peat can be applied are numerous, even alcohol being obtained.

The greatest problem encountered in the manufacture of peat fuel is the extraction of the moisture from the peat. There are three general processes in use—air, pressure, and heat. The former is best in a country where a sufficient period of dry weather can be counted on. The various methods resorted to are described by the authors of this book, and illustrations of the machinery given. The latest process for converting peat into fuel is by electricity, which has been tried in Ireland. The peat, after being raised from the bog, is delivered into a rotary hydro eliminator, in which it is subjected to a gradually increasing pressure. The eliminator is

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continuous in action, the wet material passing in at the top and leaving it at the bottom in a partially dried condition. It is then passed on to the electrifying machine, where an alternating electric current is passed through it, and is then again passed on to a kneading and moulding machine. The cost of manufacturing fuel by this process is such that it can be sold at a large profit. The fuel produced is hard, dense, and comparatively smokeless. Electro peat coal averages 30 cubic feet to the ton, ordinary coal averaging 45 cubic feet.

BOOKS ON WIRELESS TELEGRAPHY.

A Handbook of Wireless Telegraphy; its Theory and Practice. By Dr. J. Erskine-Murray. Pp. xvi+322. (London: Crosby Lockwood and Son, 1907.) Price 10s. 6d. net.

Notions générales sur la Télégraphie sans Fil. By R. de Valbreuze. Pp. vi+169. (Paris: *L'Éclairage Électrique*, 1907.)

THERE is a story, probably apocryphal, of a learned professor who undertook to edit the writings of a colleague. At the end of the first paragraph he started to write a footnote, with which he proceeded until he had completed a treatise in several volumes of far superior value to the work he was supposed to be editing. Dr. Erskine-Murray has adopted exactly the opposite system in writing his "Handbook of Wireless Telegraphy," as the following rough summary of its contents will show. He apparently started out with the good intention of writing the book himself, and in the first few pages has succeeded in presenting from a somewhat original point of view the similarities and differences between the various known systems of telegraphy. But on the ninth page appears the first sign of weakness in a half-page verbatim quotation from Sir Oliver Lodge; there is little harm in this, it is true, or in the quotation of equal length from Von Bezold three pages farther on. But it represents apparently the incubation stage of a disease which subsequently develops alarming severity. At p. 17 we find it establishing a firm hold in a five-page quotation from Hertz. Then for a time all goes smoothly, and we read a description of the earlier wireless telegraphy experiments from the author's own pen with feelings of relief. But on the sixty-second page there is a serious relapse in the form of a quotation twenty-eight and a half pages long from a paper on coherers published by Dr. Eccles in the *Electrician*. At the end of this quotation we are told that the results may be summarised in a few words—the summary occupies sixteen lines. We would suggest that in the next edition of the handbook Dr. Erskine-Murray retains only the summary and gives the necessary reference to the original paper.

After such an experience we are not surprised at meeting on p. 100 the first of three successive quotations occupying, with a dozen or so lines of interpolated reference, more than twenty pages; on p. 124 a three-page quotation from a paper by Lieut. Tissot; on p. 129 five pages from a paper by Mr. Duddell. Then, after a brief rest, comes a twenty-page description of the Lodge-Muirhead system from an article by Mr. Marillier in the *Electrician*, and immediately after this twelve pages descriptive of tests on the Fessenden system, including some very uninteresting official correspondence; and so the handbook proceeds to a finish with two more quotations fourteen and fifteen pages long respectively, and nine others varying from one and a half to six pages in length. The only thing that causes surprise in the latter part of the book is that, when Dr. Erskine-Murray refers to Euclid's "well-known work on geometry" in support of his contention that the *surfaces* to be kept clean in relay contacts are "thin, very thin," he resists the temptation to quote at length from that authority (with kind permission of the author).

It is hardly necessary to say that when in a book of 318 pages, 140 are verbatim quotations from other writers, the whole is not particularly coherent. With all due respect to Dr. Erskine-Murray, we submit that this handbook is a striking example of how not to write on wireless telegraphy or any other subject. Books on scientific or technical subjects have a quite definite function to fulfil, distinct from that fulfilled by publications in scientific journals or papers. One does not look to them for new discoveries, or rarely even new theories, but one expects, in a handbook at least, to find a clear *résumé* of existing facts and theories welded together into a consistent whole possessing some sort of literary as well as scientific homogeneity. He who takes up this handbook with such expectations is destined, we fear, to grievous disappointment, though he may find much of intrinsic value and interest, particularly, for example, the seventeenth chapter, on theories of transmission.

M. de Valbreuze's book is of a different stamp; there is nothing in it very novel, either in subject-matter or treatment, but it gives from start to finish a clear and carefully-thought-out account of electric-wave telegraphy. The author starts in a manner rather characteristic of French writers by a fairly full account of the most elementary electrical and magnetic principles. In fact, it is not until half-way through the book that we are introduced to wireless telegraphy proper. Nevertheless, room is left for a summary of the more important researches and descriptions of the leading systems. Though in no sense an advanced treatise, the book is likely to prove of interest to the expert as well as to the beginner; at least, it can be read through without tedium, and can be recommended to all who, possessing little or even no electrical knowledge, are anxious to become acquainted with the leading principles and practice of wireless telegraphy.

We have already, on more than one occasion, commented in Nature on the number of books which have been written on wireless telegraphy. Each year sees fresh ones added to the list, and still an insatiable public, its imagination fired by the mysterious mechanism of this newest art, is, Oliver Twist like, asking for more. The two volumes before us show how, in different manners, this craving may be allayed.

Maurice Solomon.

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